

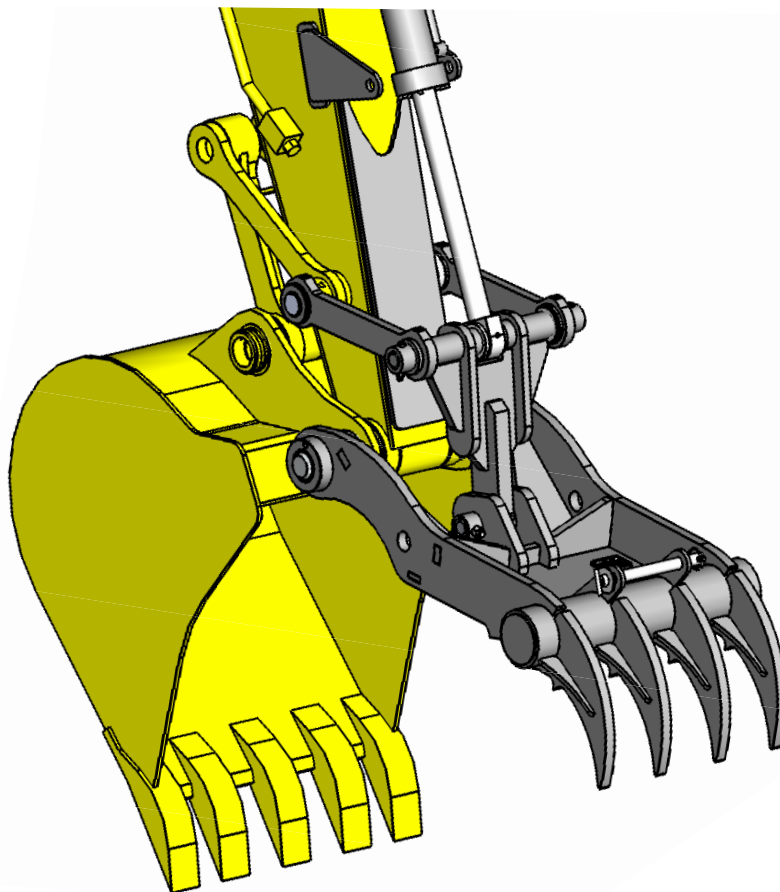


**CP**

BY PALADIN

# OPERATOR'S MANUAL

## PROGRESSIVE LINK HYDRAULIC THUMB



SERIAL NUMBER: \_\_\_\_\_

MODEL NUMBER: \_\_\_\_\_

Manual Number: OM70P

Rev:



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# PREFACE

## GENERAL COMMENTS

Congratulations on the purchase of your new C&P product! This product was carefully designed and manufactured to give you many years of dependable service. Only minor maintenance (such as cleaning and lubricating) is required to keep it in top working condition. Be sure to observe all maintenance procedures and safety precautions in this manual and on any safety decals located on the product and on any equipment on which the attachment is mounted.

This manual has been designed to help you do a better, safer job. Read this manual carefully and become familiar with its contents.

**WARNING!**  **Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual. Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.**

Unless noted otherwise, right and left sides are determined from the operator's control position when facing the attachment.

**NOTE:** The illustrations and data used in this manual were current (according to the information available to us) at the time of printing, however, we reserve the right to redesign and change the attachment as may be necessary without notification.

## BEFORE OPERATION

The primary responsibility for safety with this equipment falls to the operator. Make sure the equipment is operated only by trained individuals that have read and understand this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or the manufacturer. Keep this manual available for reference. Provide this manual to any new owners and/or operators.

## SAFETY ALERT SYMBOL



This is the "Safety Alert Symbol" used by this industry. This symbol is used to warn of possible injury. Be sure to read all warnings carefully. They are included for your safety and for the safety of others working with you.

## SERVICE

Use only manufacturer replacement parts. Substitute parts may not meet the required standards.

Record the model and serial number of your unit on the cover of this manual. The parts department needs this information to insure that you receive the correct parts.

## SOUND AND VIBRATION

Sound pressure levels and vibration data for this attachment are influenced by many different parameters; some items are listed below (not inclusive):

- prime mover type, age condition, with or without cab enclosure and configuration
- operator training, behavior and stress level
- job site organization, working material condition and environment

Based on the uncertainty of the prime mover, operator and job site it is not possible to get precise machine and operator sound pressure levels or vibration levels for this attachment.

**NOTE:** A list of all Paladin Patents can be found at <http://www.paladinattachments.com/patents.asp>.

# SAFETY STATEMENTS



THIS SYMBOL BY ITSELF OR WITH A WARNING WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



## **DANGER**

THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH WILL RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



## **WARNING**

THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



## **CAUTION**

THIS SIGNAL WORD IS USED WHERE MINOR INJURY COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.

## **NOTICE**

NOTICE INDICATES A PROPERTY DAMAGE MESSAGE.

## GENERAL SAFETY PRECAUTIONS

### **WARNING!**

#### **READ MANUAL PRIOR TO INSTALLATION**



Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual, as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVER'S MANUAL(S).**



#### **READ AND UNDERSTAND ALL SAFETY STATEMENTS**

Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing, or operating this equipment.



#### **KNOW YOUR EQUIPMENT**

Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to ensure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued, or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

## GENERAL SAFETY PRECAUTIONS

### WARNING!



#### PROTECT AGAINST FLYING DEBRIS

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out, or when any operation causes dust, flying debris, or any other hazardous material.

### WARNING!



#### LOWER OR SUPPORT RAISED EQUIPMENT

Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or on blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

### WARNING!



#### USE CARE WITH HYDRAULIC FLUID PRESSURE

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime mover's operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.

- Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.
- If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him or her to research it immediately to determine proper treatment.
- Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS! SEE ILLUSTRATION.**

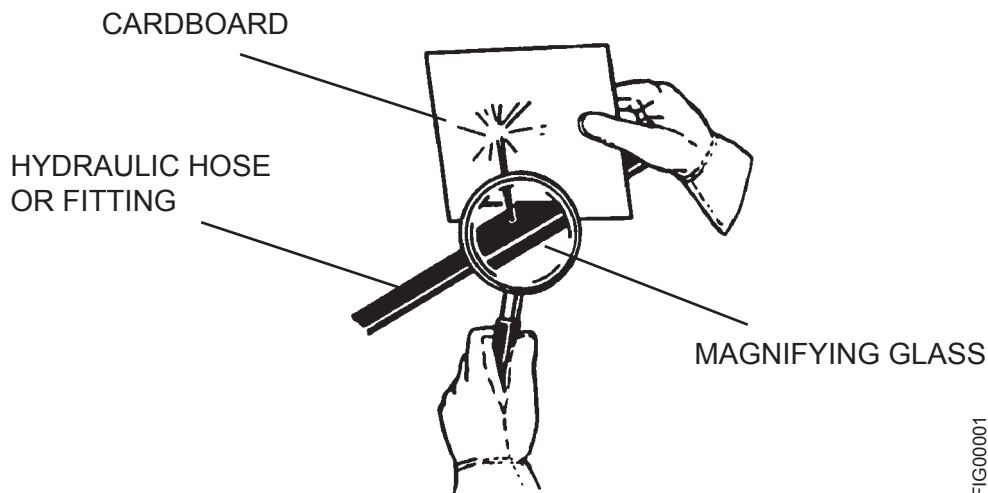


FIG00001

## EQUIPMENT SAFETY PRECAUTIONS

### WARNING!



#### KNOW WHERE UTILITIES ARE

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter.

### WARNING!



#### EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.

It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

### WARNING!



#### REMOVE PAINT BEFORE WELDING OR HEATING

Hazardous fumes/dust can be generated when paint is heated by welding, soldering or using a torch. Do all work outside or in a well ventilated area, and dispose of paint and solvent properly. Remove paint before welding or heating.

When sanding or grinding paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

### WARNING!



#### END OF LIFE DISPOSAL

At the completion of the useful life of the unit, drain all fluids and dismantle by separating the different materials (rubber, steel, plastic, etc.). Follow all federal, state and local regulations for recycling and disposal of the fluid and components.



#### OPERATING THE ATTACHMENT

- Never use your attachment for a work platform or personnel carrier.
- Do not exceed the lifting capacity of your prime mover.
- Operate only from the operator's station.
- When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Never lift, move, or swing a load or attachment over anyone.
- Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine and remove the key.



# EQUIPMENT SAFETY PRECAUTIONS



## TRANSPORTING THE ATTACHMENT

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough terrain and slopes.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc., as a cave-in could result.



## MAINTAINING THE ATTACHMENT

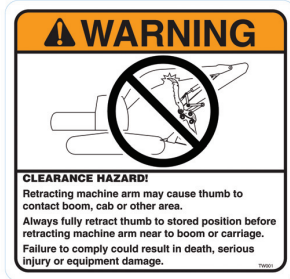
- Before performing maintenance (unless otherwise specified), lower the attachment to the ground, apply the brakes, turn off the engine and remove key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair, check for correct functioning of the attachment. If not functioning properly, always tag “DO NOT OPERATE” until all problems are corrected.
- Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from your local dealer or the manufacturer.
- Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- Never work under a raised attachment.

# DECALS

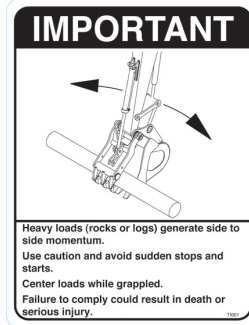
## DECAL PLACEMENT

### GENERAL INFORMATION

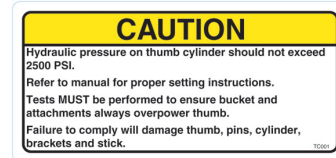
The diagram below shows the location of decals used with the attachment. The decals are identified by their part numbers and with reductions of the actual decals. Use this information to order replacements for lost or damaged decals. Be sure to read all the decals before operating equipment. They contain information you need to know for both safety and product longevity.



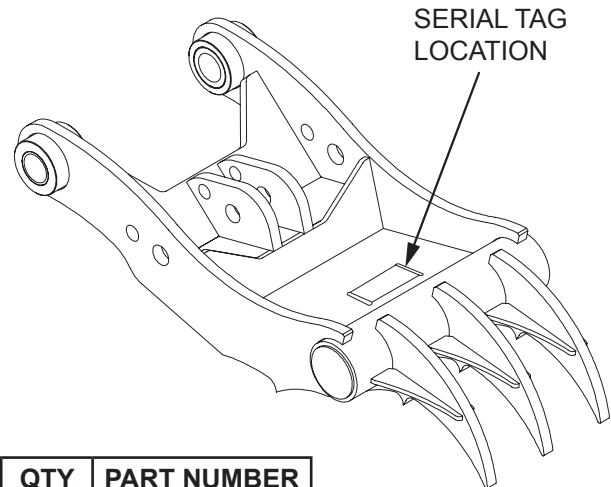
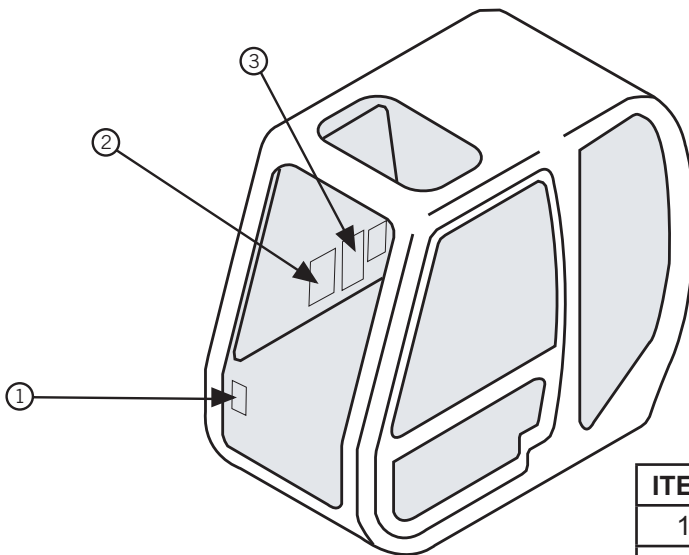
WARNING! CLEARANCE HAZARD  
PART #TW001



IMPORTANT! LOAD IMBALANCE  
PART #TI001



CAUTION! HYDRAULIC PRESSURE  
PART #TC001



ITEM	QTY	PART NUMBER
1	1	TW001
2	1	TI001
3	1	TC001

Decals can only be ordered as kit# TK03

**IMPORTANT:** Keep all safety decals clean and legible. Replace all missing, illegible or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced.

**REPLACING SAFETY DECALS:** Clean the area of application with nonflammable solvent, then wash the same area with soap and water. Allow surface to fully dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram above and smooth out any bubbles.

# INSTALLATION



Thoroughly read and understand this manual before starting installation. There are many different types of attachments that can be used in combination with the thumb. Care should be taken in coordinating installation to coincide with the appropriate attachment (bucket, etc.) for the machine.

## **WARNING!**



**KEEP ALL UNNECESSARY PERSONNEL FROM INSTALLATION AREA.**

Attachment can drop without warning if not properly attached. Failure to do so could result in serious injury or death.

## **REQUIRED TOOLS**

- Standard English and metric wrench sets
- Standard English and metric Allen wrench sets
- Phillips head and flat head screwdrivers
- Two or more people
- 8 lb. Hammer
- Lift chain and strap
- Grinder for weld preparation
- Welder capable of 7018 low hydrogen or equivalent.
- Wire cutters and crimpers
- Measuring tape
- Torque wrench

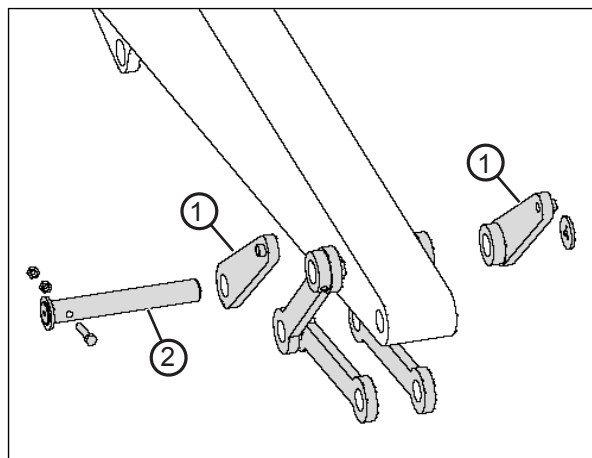
## **MACHINE SET-UP:**

- Thoroughly clean the arm / bucket joint area at the end of the machine arm to avoid bearing contamination.
- Disconnect battery before doing any welding on the machine. If possible, disconnect the on-board computer. Failure to do so could result in damage to the machine's electrical system.
- If using a coupler, ALWAYS remove the bucket from the coupler before installing the thumb. DO NOT remove the bucket or coupler from the machine arm.

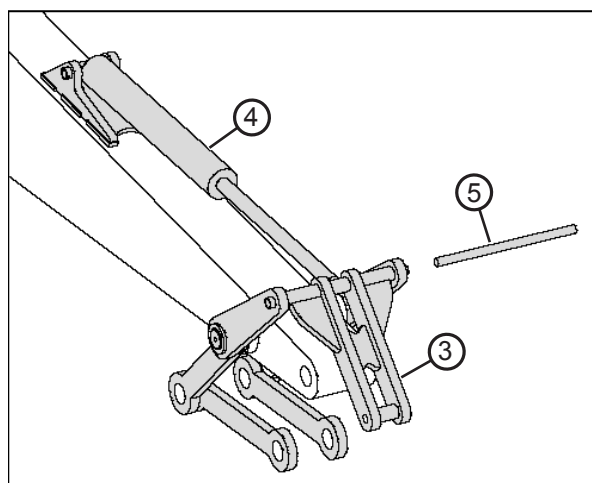
# INSTALLATION

## INSTALLING THUMB

Pin on stick linkages (1). Use original locking bolt to secure the linkage pin (2) to the ring on original stick linkage.



Next, pin the thumb linkage (3) and the hydraulic cylinder (4) to the stick linkages, using pin (5). Make sure to install all locking bolts/cotter pins. Use hoist or similar device to help support cylinder during installation if needed.

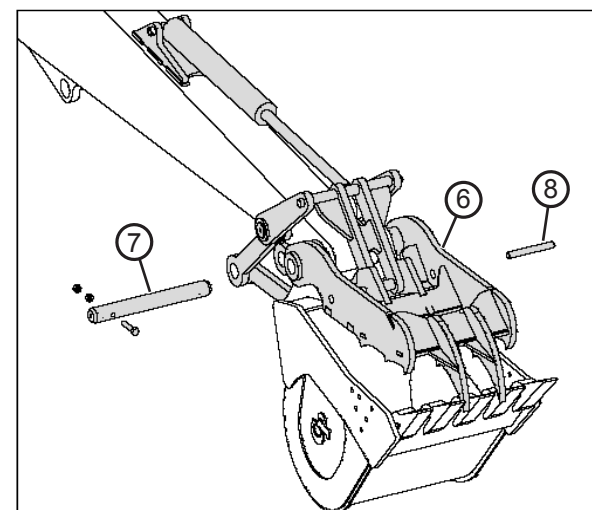


Remove and discard original bucket stick pin.

Pin on thumb body (6) and bucket. Use original locking bolt to secure the thumb main pin (7) to the ring on the bucket. Use hoist or similar device to help support thumb body during installation if needed.

Pin thumb linkage to the thumb using pin (8) and fasten locking bolt.

After installing the thumb body, check for proper fit and clearance before proceeding.



# INSTALLATION



## **DO NOT WELD ACROSS WIDTH OF MACHINE ARM.**

Always weld parallel to the long axis of the arm. Failure to do so could result in weakening of the machine arm.

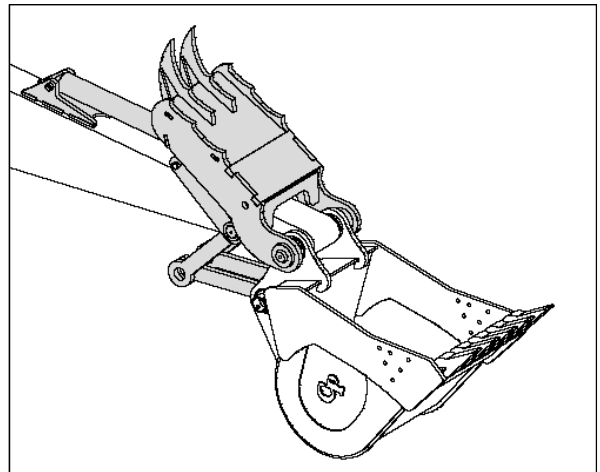


## **PROTECT SURROUNDING AREA BEFORE WELDING**

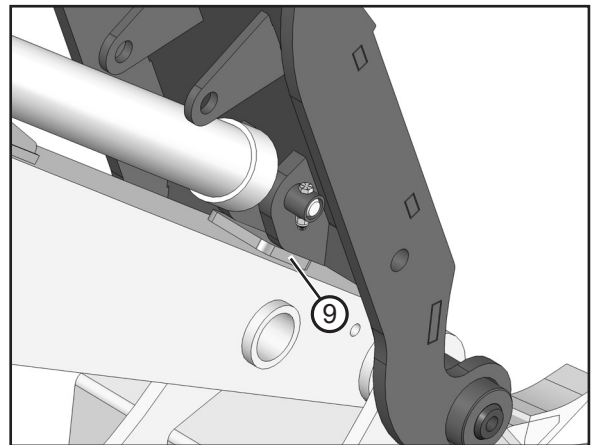
Weld spatter can cause damage to components such as pins, cylinders, hydraulic hoses and fittings, etc.

**NOTE:** See general welding specifications listed on page 26 before welding.

Rotate thumb body back until cylinder is fully compressed.

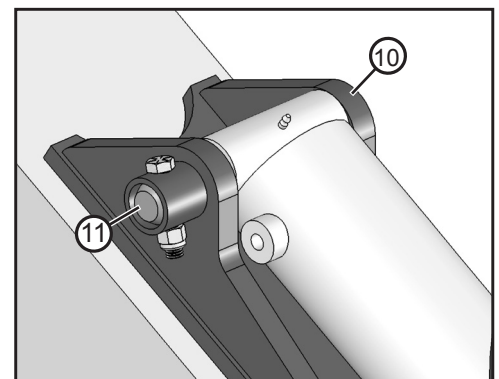


Center rest plate (9) on stick under thumb cylinder pin boss. Mark location.



With cylinder compressed and free, align base of cylinder with mount bracket (10) and install pin (11).

Secure pin (11) using pin locking hardware.

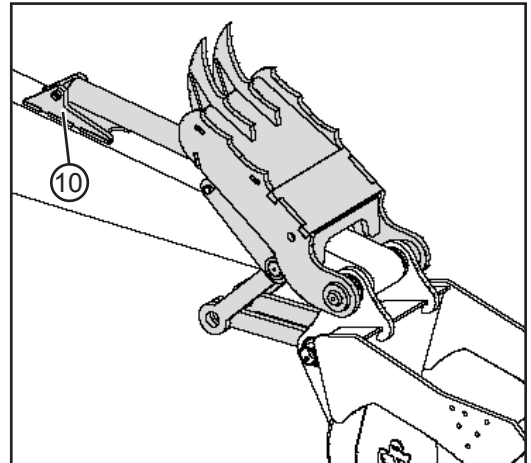


## INSTALLATION

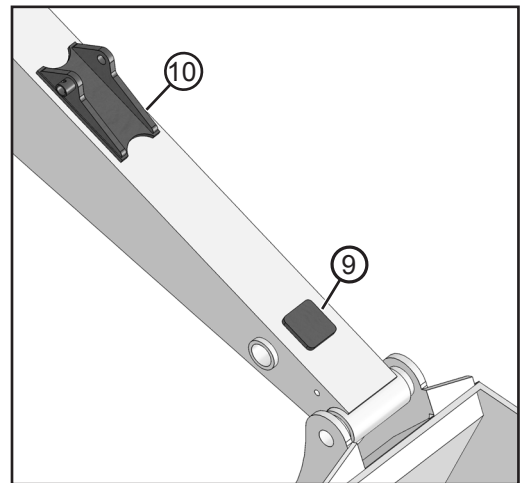
Rotate thumb and cylinder assembly so the cylinder mount bracket (10) will move up the machine arm as far as clearances will permit.

**NOTE: Leave approximately 1/4" of stroke in the cylinder rod to keep cylinder from bottoming out.**

With cylinder base bracket centered on stick, mark location.



Remove paint from marked areas and tack weld rest plate (9) and cylinder base bracket (10) in place.

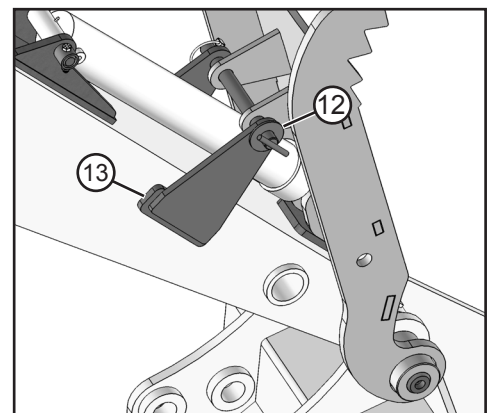


With thumb body on rest plate, use lock pin (12) to align holes in lock back brackets (13) and thumb body.

Position lock back brackets on sides of machine stick and mark locations.

**NOTE: Make sure sufficient clearance exists between the lock pin and the cylinder. Some cutting or shimming may be required.**

Remove paint from marked areas and tack weld brackets into place.



# INSTALLATION

Fully rotate thumb to check alignment and clearances between bucket and thumb. Make sure to check that all pins, bolts and nuts are installed and tightened.

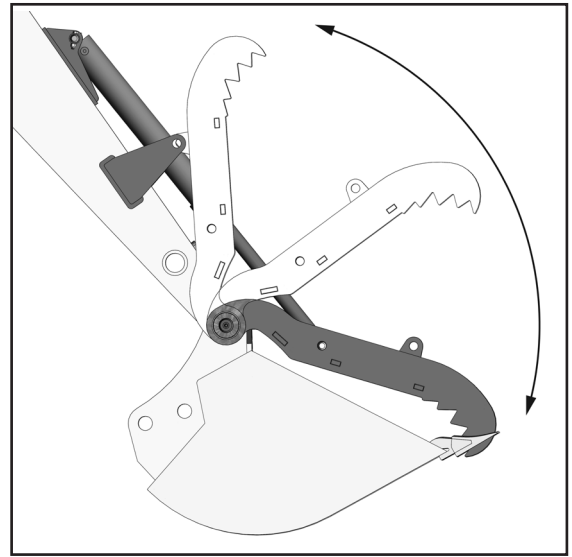


**Improper alignment could impair thumb performance and cause damage to the machine arm and attachments.**

With thumb in proper position, proceed with final welding.

Reference pages 16-19 for further welding guidelines on the thumb rest plate, cylinder base bracket and lock back brackets.

Allow welds to cool and touch up paint.

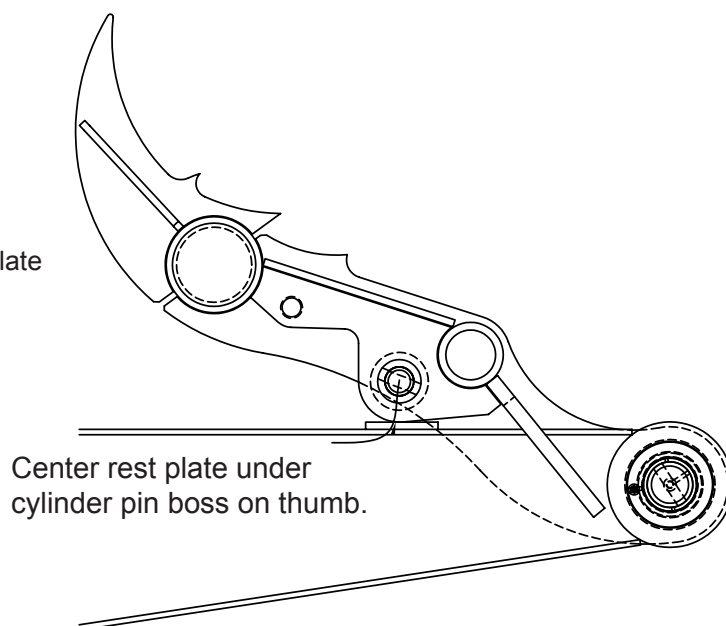
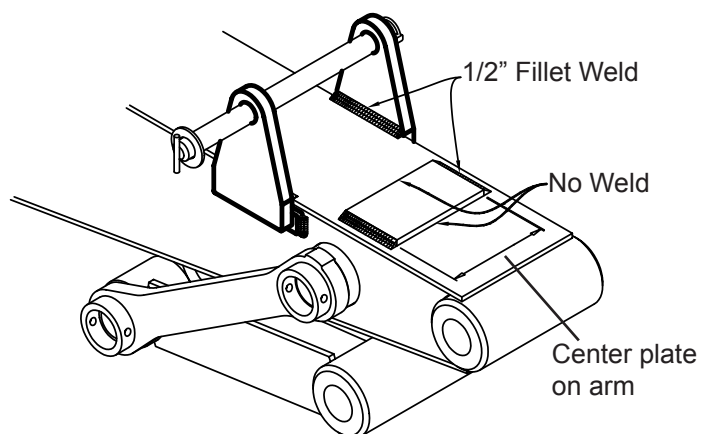


# INSTALLATION

## WELDING GUIDELINES REST PLATE - STYLE 1



Hydraulic cylinder may be damaged if rest plate is not installed.



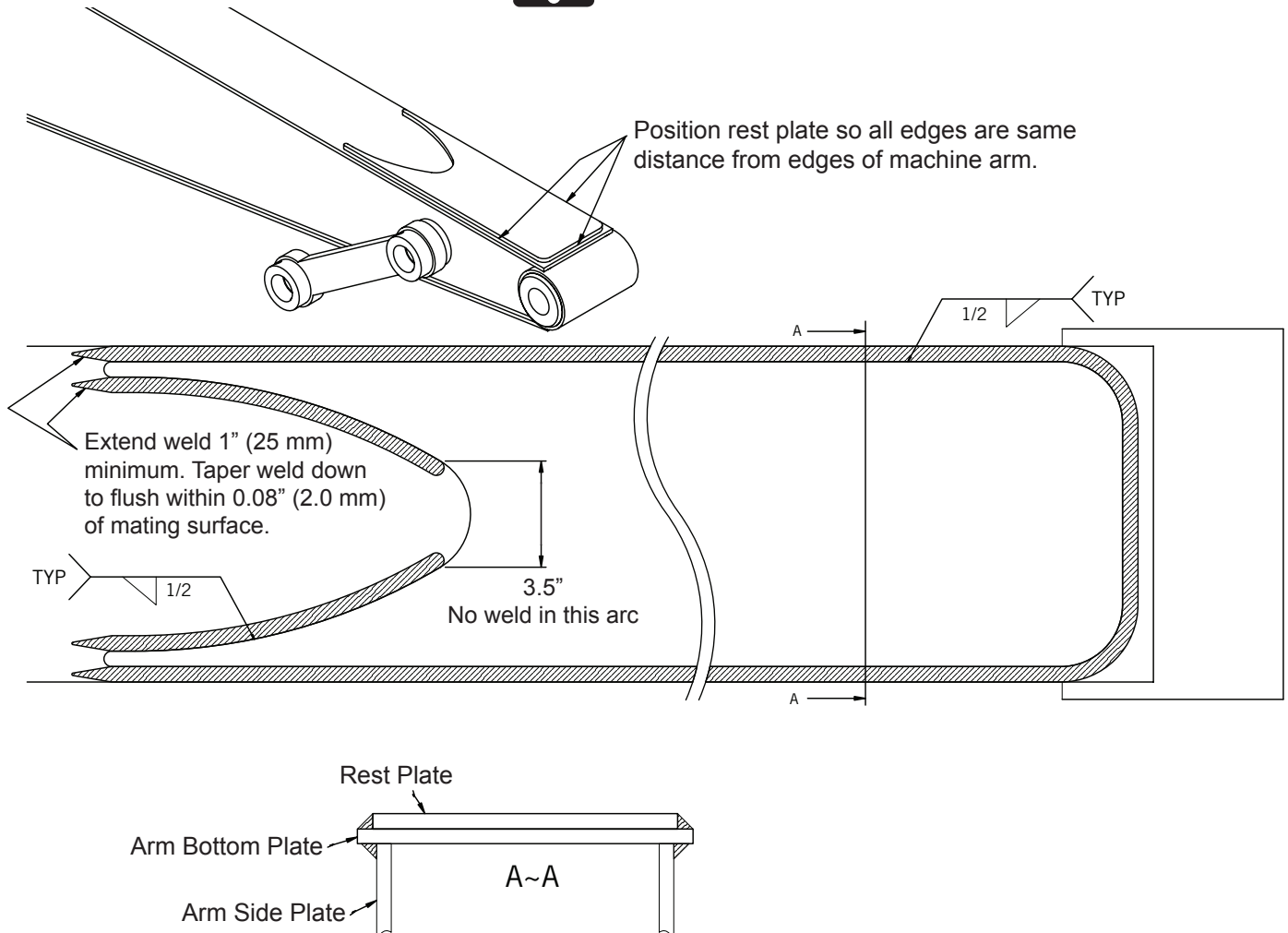


# INSTALLATION

## WELDING GUIDELINES REST PLATE - STYLE 2

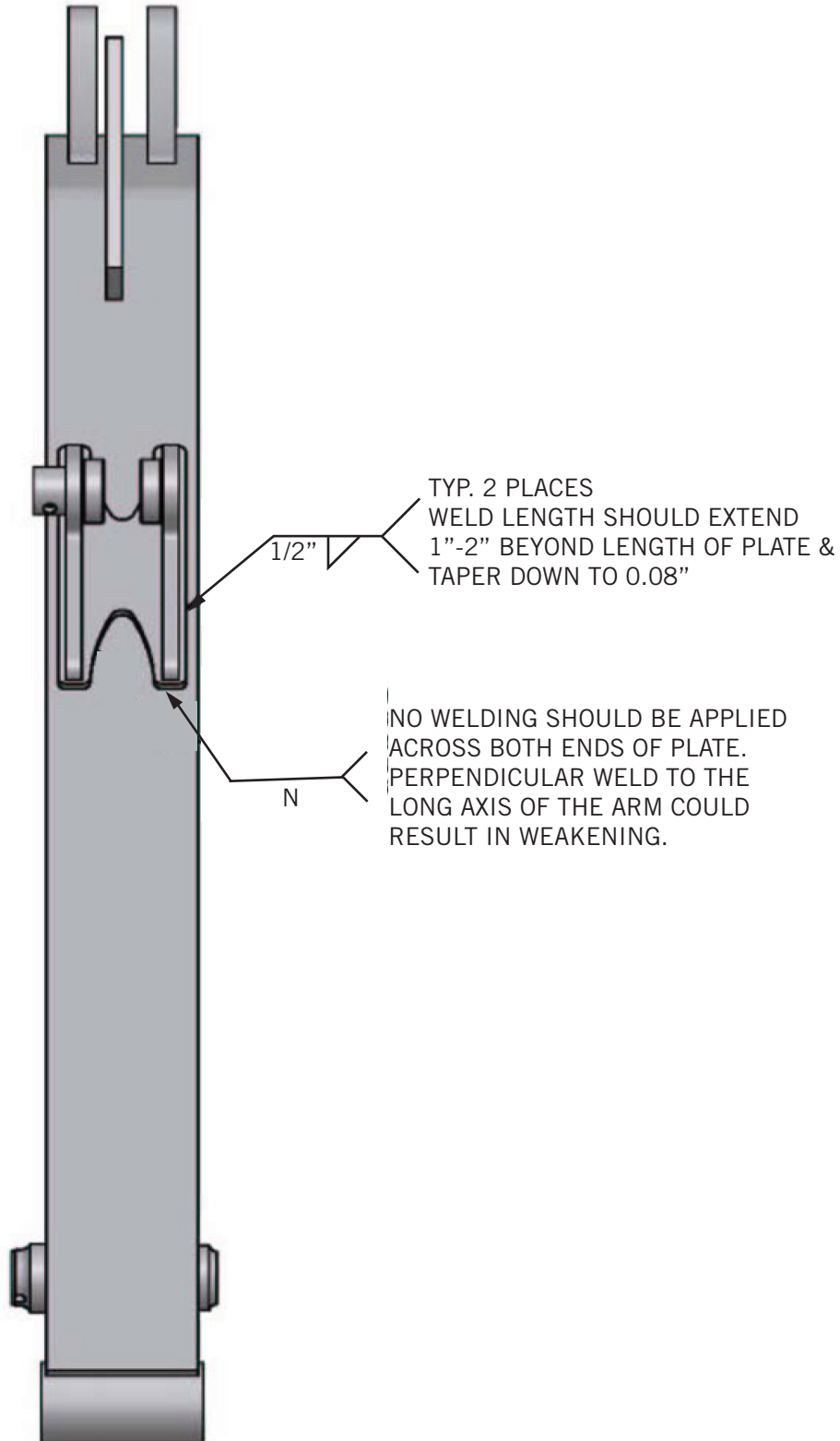


Hydraulic cylinder may be damaged if rest plate is not installed.



# INSTALLATION

## WELDING GUIDELINES CYLINDER BASE BRACKET

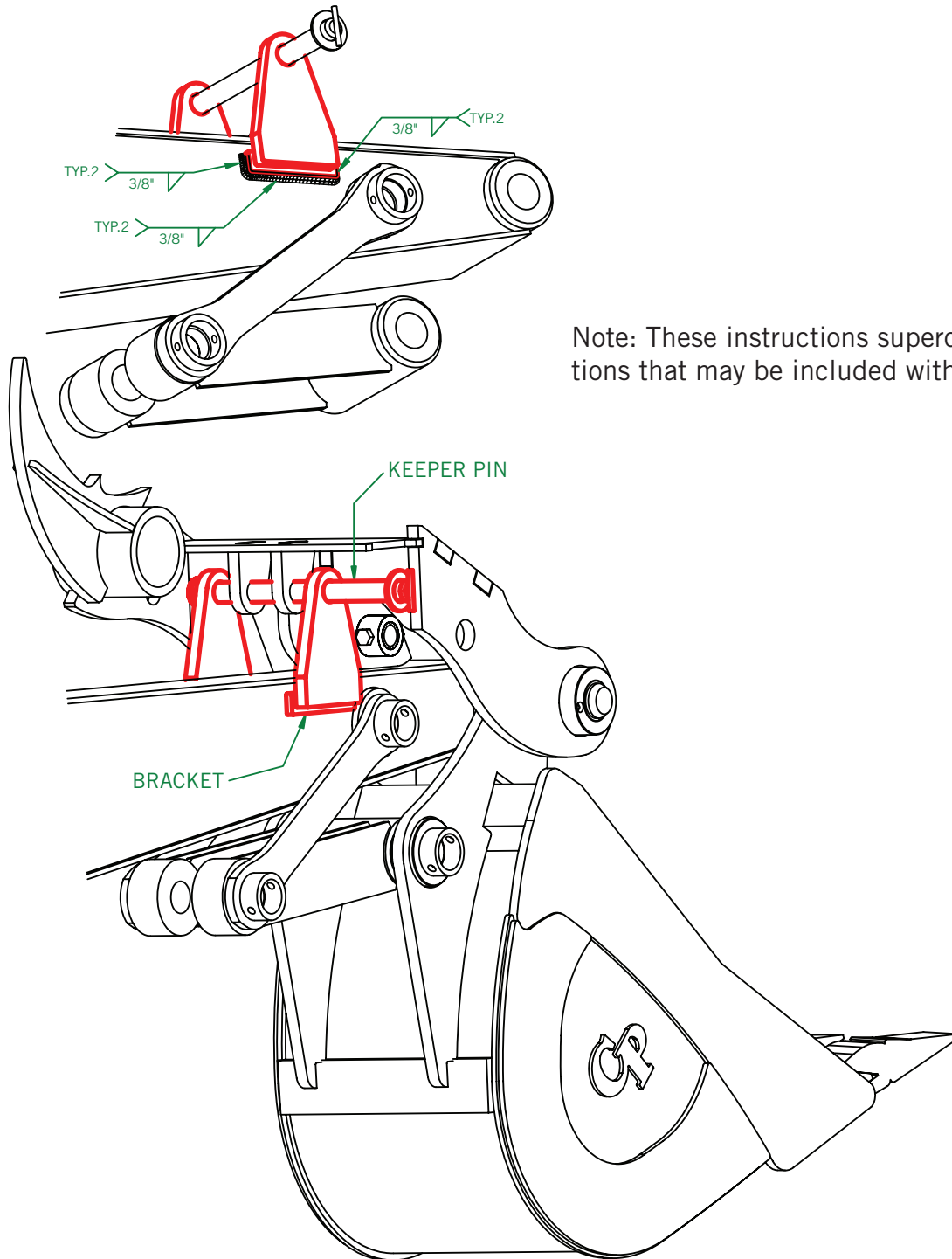


# INSTALLATION

## WELDING GUIDELINES

### LOCK BACK BRACKET INSTALLATION

With rest plate in place and thumb retracted and rested on plate, weld lock-back brackets to machine arm after aligning bracket holes using the keeper pin. Make sure plenty of space is left so that cylinder does not contact the keeper pin. Some cutting or shimming may be required. (Smaller thumb assemblies may not require this lock-back. Please refer to your packing list).



Note: These instructions supercede any instructions that may be included with packing list.

# INSTALLATION

## CONNECTING HYDRAULICS

1. Before starting, consult the manual provided in the hydraulic kit for specific makes and models.
2. Turn off the machine engine and then turn the ignition key back to the ON position. DO NOT start the engine. Relieve the hydraulic pressure in the system. Turn the ignition key to the OFF position and remove it from the ignition switch. Following the machine service manual, bleed the air pressure from the hydraulic oil tank. The hydraulic oil pressure supply to operate the thumb will attach to the bucket cylinder retract circuit. Relieving all hydraulic pressure will minimize loss of hydraulic fluid.
3. Attach a vacuum pump to the machines hydraulic fluid reservoir to minimize drainage of hydraulic fluid.
4. Finish attaching all hydraulic hose and fittings needed for installation. Reference hydraulic hose requirements below.
5. Turn off vacuum pump and remove it from the hydraulic fluid reservoir.
6. Check that all hydraulic fittings are tight.



**Hydraulic pressure on the thumb cylinder should not exceed 2500 PSI. It is essential to ensure the bucket always overpowers the thumb. Refer to prime mover operator's/service manual for procedures on checking and adjusting auxiliary circuit valve to the recommended pressure.**

# OPERATION

## INTENDED USE

The thumb is designed to be used in conjunction with a specific attachment and machine type for loading, unloading and transporting objects or material. Use in any other way is considered contrary to the intended use.

## MISUSE

Forms of misuse include, and are not limited to: using the thumb to “rake” material, to “push” or “pull” material, using the sides of the thumb to move material, using the thumb with rope/chain as a lifting device or using the thumb as a “pry bar” to dislodge objects.

Misuse of the thumb may cause damage to the bucket, stick and boom and result in a loss of warranty and serious personal injury or death.

## OPERATING THE THUMB

**NOTE: If thumb is installed on an extendable stick, only operate with stick in the fully retracted position.**

Read all Safety Precautions before operating the equipment. Also refer to the prime mover operator’s manual for attachment operation.

Buckets used in conjunction with the thumb may come from a different manufacturer. Always refer to the attachment manufacturer’s product manual for proper usage instructions.

If a coupler is used with the thumb, refer to the coupler manufacturer’s product manual for proper usage instructions.

- The operator should become familiar with the machine controls and how they function to operate the attachment.
- DO NOT overload the bucket and thumb capacity or damage to the bucket, thumb and/or machine stick may result.
- Close the thumb to the fullest extent possible and lift the attachment slightly to be certain the load is secure.

**NOTE: If the load appears to be unstable, lower the attachment to the ground, open the thumb and reposition the load to attain full stability. Repeat until full stability is achieved.**



**Because a heavy load (rock or logs) can generate a great deal of momentum in side-to-side movements, the operator should always use caution and avoid sudden stops and starts.**

# OPERATION

## LOCKING THE THUMB (STORAGE POSITION)

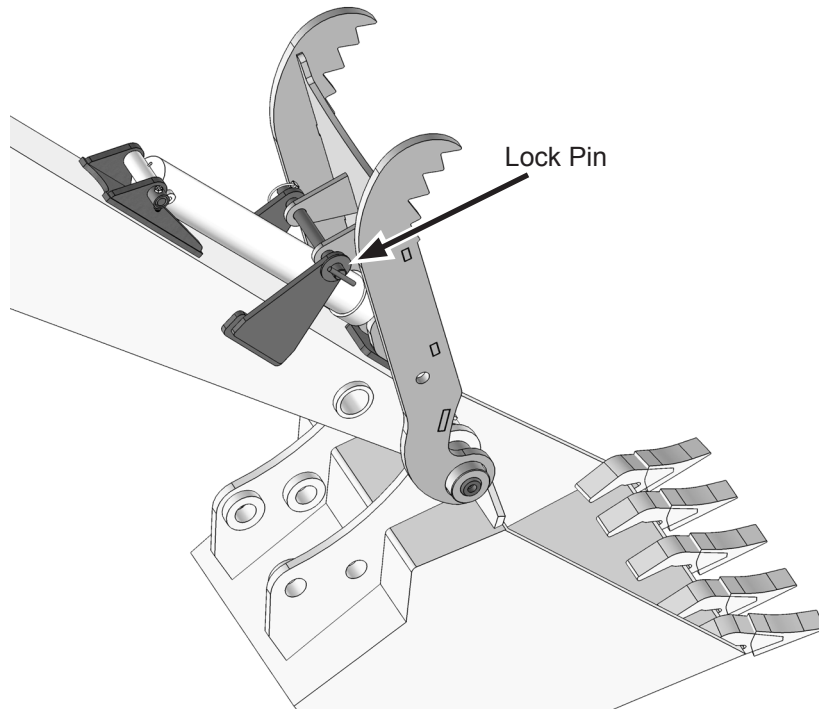
For applications when the thumb is not in use, it can be locked out of the way with the use of a lock pin.

### To lock the thumb:

Remove quick pin and remove lock pin from stored position.

Retract thumb until hydraulic cylinder is fully compressed. This should align holes in thumb body with holes in lock back bracket on stick.

Reinsert lock pin and secure with quick pin.



## STORAGE:

- Clean the unit thoroughly, removing all mud, dirt, and grease.
- Apply a light coating of oil to all exposed metal parts to prohibit corrosion.
- Inspect for visible signs of wear, breakage, or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

## Additional Precautions for Long Term Storage:

- Touch up all unpainted surfaces with paint to prevent rust

## REMOVAL FROM STORAGE:

- Remove cover
- Wash unit and replace any damage and/or missing parts
- Lubricate grease fittings
- Check hydraulic hoses for damage and replace as necessary

# OPERATION

## LIFT POINTS

Lifting points are identified by lifting decals where required. Lifting at other points is unsafe and can damage attachment. Do not attach lifting accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach lifting accessories to unit at any recommended lifting points.
- Bring lifting accessories together to a central lifting point.
- Lift gradually, maintaining the equilibrium of the unit.

**WARNING!** Use lifting accessories (chains, slings, ropes, shackles and etc.) that are capable of supporting the size and weight of your attachment. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing serious personal injury or death.



## TIE DOWN POINTS

Tiedown points are identified by tiedown decals where required. Securing to trailer at other points is unsafe and can damage attachment. Do not attach tie down accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach tie down accessories to unit as recommended.
- Check unit stability before transporting.

**WARNING!** Verify that all tiedown accessories (chains, slings, ropes, shackles and etc.) are capable of maintaining attachment stability during transporting and are attached in such a way to prevent unintended disengagement or shifting of the unit. Failure to do so could result in serious personal injury or death.



## TRANSPORTING

Follow all local government regulations that may apply along with recommended tiedown points and any equipment safety precautions at the front of this handbook when transporting your attachment.

# MAINTENANCE

## GENERAL INFORMATION

Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However it is very important that these maintenance functions be performed as described below. Read and follow all safety precautions before performing any maintenance or troubleshooting on this equipment.

## MAINTENANCE SCHEDULE

PROCEDURE	DAILY	WEEKLY	NOTES
Remove debris from attachment	✓		Primarily around cylinder
Check that pins and pin locking hardware are secure	✓		Refer to torque table
Lubricate grease points	✓		Reference diagram below for grease point locations. In extreme conditions, such as heavy dust or underwater use, lubricate every 4 hours.
Check attachment for cracked, bent or broken components and distressed welds	✓		Clean attachment thoroughly before inspection. If a crack is found in either the steel structure or welds, the attachment <b>must</b> be removed from the machine and the manufacturer contacted immediately. Replace broken or missing parts if required.
Check hydraulic hoses/components for leaks and/or damage	✓		
Ensure daily checks are carried out		✓	

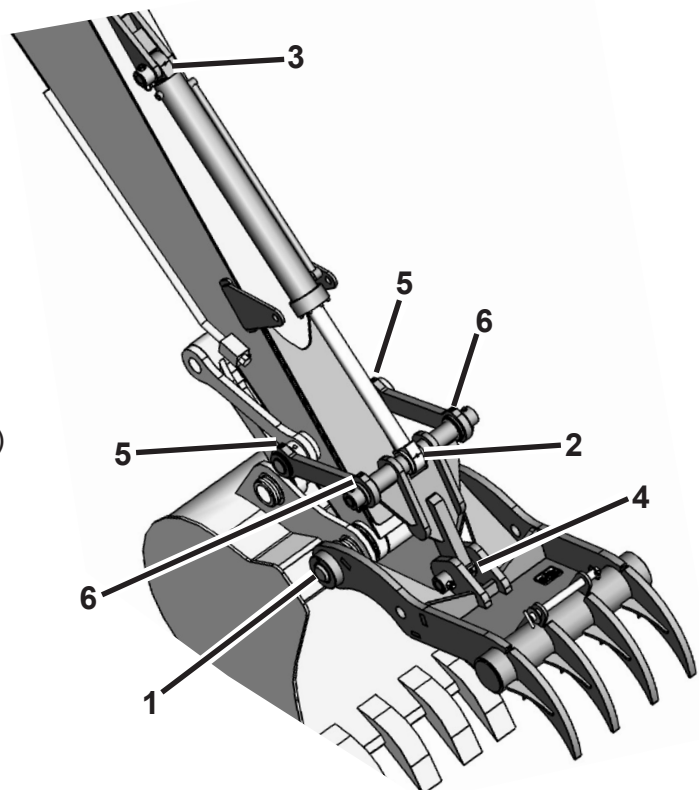
## GREASING THE ATTACHMENT

To keep the attachment in proper working condition, it must be greased on a daily basis.

Grease points on the attachment are as shown. If any grease fittings are missing or damaged, replace and grease.

**NOTE: Cylinders and pins that are supplied without grease zerks DO NOT need to be greased.**

- 1 - Main Pin (both sides)
- 2 - Cylinder Rod
- 3 - Cylinder Base
- 4 - Thumb Link Pin
- 5 - Stick Link
- 6 - Stick Link (cylinder rod pin)





## TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Thumb cylinder does not extend or retract properly.	Hoses or valves are plugged by dirt.	Remove hoses and valve. Clean hoses and valve spool. Blow air through valve to check operation.

# SPECIFICATIONS

## WELDING SPECIFICATIONS FOR INSTALLATION PROCESS

The sole purpose of this section is to provide specific details and instruction for the installation process of the thumbs stated within. Articles to be addressed are as follows:

- Approved Welding Process/Electrodes and Protection - (SMAW/GMAW)
- Weld Quality - VWI (*AWS D1.1. 2004 Edition*)
- Specific Weld Sizes and Locations

**Article I.      Approved Welding Process/Electrodes and Protection**

*Section 1.01*    **The SMAW or GMAW process is suited for the installation process of all thumbs produced by C&P. If an SMAW process is chosen for this installation, the type of electrode to be utilized is an E7018.**

*Refer to AWS D1.1 Section 5.3.2.1, 2004 Edition for Low - Hydrogen Electrode Storage Conditions*

**The conditions for maintaining the specified electrodes shall be satisfied prior to the installation process.**

**If the GMAW process is utilized, the classification strength of the filler metal should meet the same characteristics/properties as that of the E7018 of the SMAW process.**

**Article II.     Weld Quality - (VWI)**

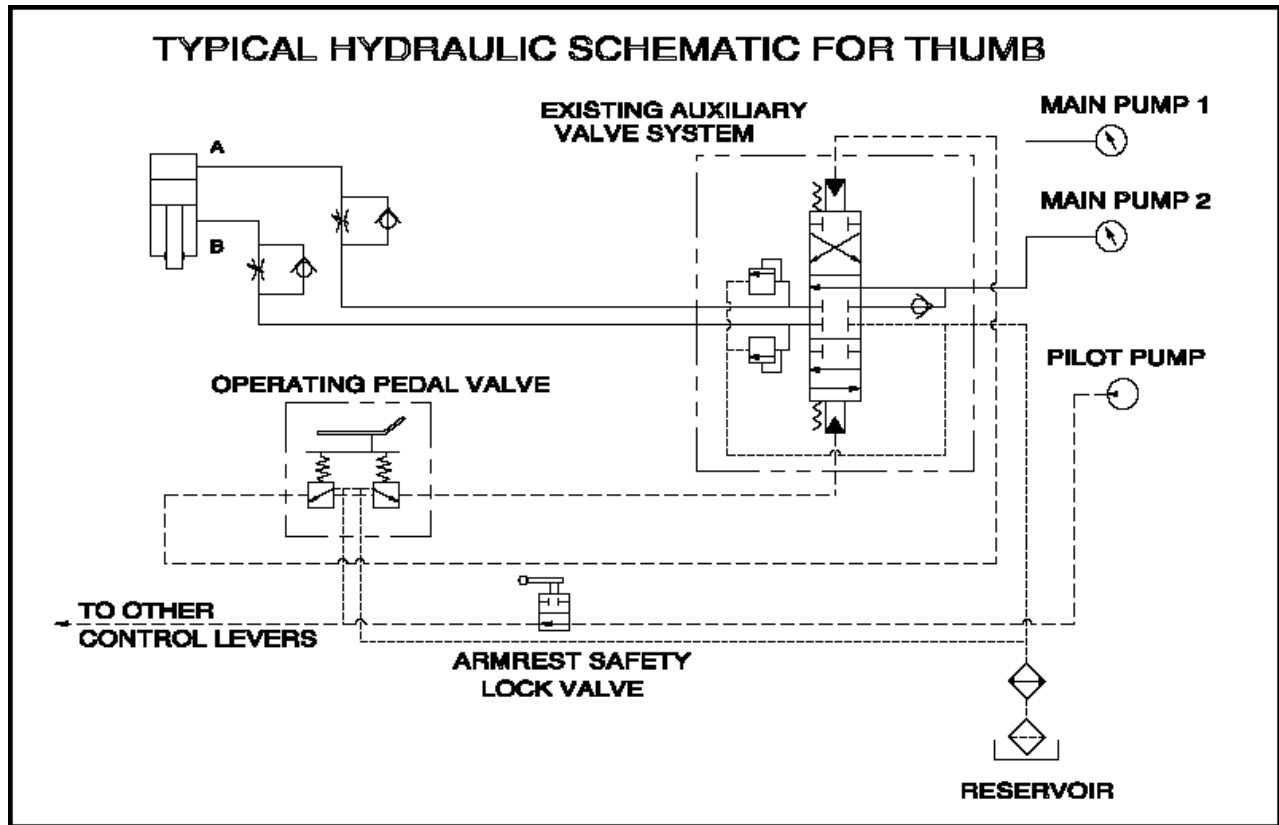
*Section 2.01*    **To insure the highest level of quality is provided a Visual Weld Inspection should be performed after the welding process is complete. This process should be performed in accordance with AWS D1.1 Section 4.8.1 Visual Inspection. If any discontinuities or discrepancies are identified they should be repaired in accordance to AWS D1.1, Section 5.26 Repairs.**

**Article III.    Specific Weld Sizes and Locations**

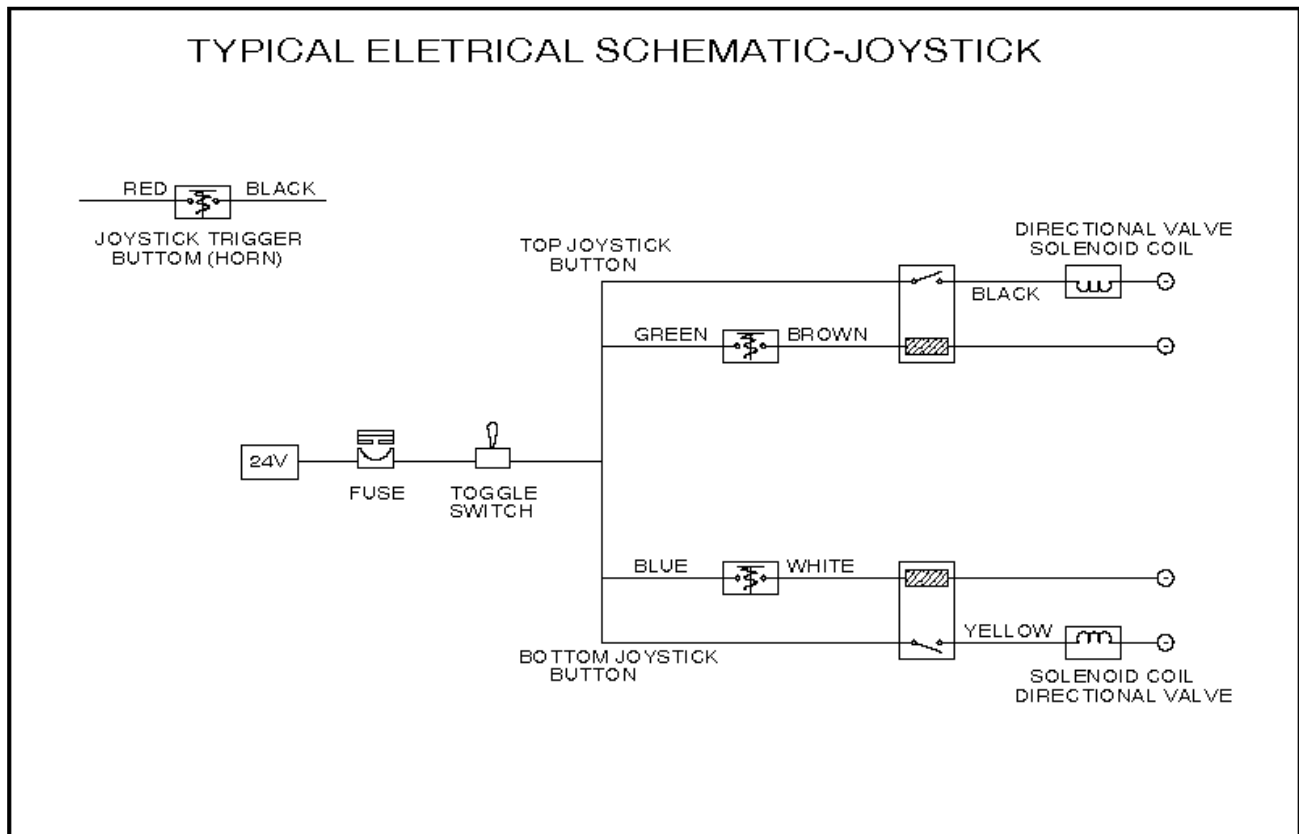
*Section 3.01*    **Refer to pages 16-19 for specific weld sizes and locations.**

# SPECIFICATIONS

## HYDRAULIC SCHEMATIC



## ELECTRICAL SCHEMATIC



# SPECIFICATIONS

## BOLT TORQUE SPECIFICATIONS

### GENERAL TORQUE SPECIFICATION TABLES


Use the following charts when determining bolt torque specifications when special torques are not given. Always use grade 5 or better when replacing bolts.

### SAE BOLT TORQUE SPECIFICATIONS




**NOTE:** The following torque values are for use with extreme pressure lubricants, plating or hard washer applications. Increase torque 15% when using hardware that is unplated and either dry or lubricated with engine oil.

Bolt Size		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE				Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary
		Pounds Feet		Newton-Meters		Pounds Feet		Newton-Meters		
Inches	Millimeters	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	
1/4	6.35	8	9	11	12	10	13	14	18	
5/16	7.94	14	17	19	23	20	25	27	34	
3/8	9.53	30	36	41	49	38	46	52	62	
7/16	11.11	46	54	62	73	60	71	81	96	
1/2	12.70	68	82	92	111	94	112	127	152	
9/16	14.29	94	112	127	152	136	163	184	221	
5/8	15.88	128	153	174	207	187	224	254	304	
3/4	19.05	230	275	312	373	323	395	438	536	
7/8	22.23	340	408	461	553	510	612	691	830	
1	25.40	493	592	668	803	765	918	1037	1245	
1-1/8	25.58	680	748	922	1014	1088	1224	1475	1660	
1-1/4	31.75	952	1054	1291	1429	1547	1700	2097	2305	
1-3/8	34.93	1241	1428	1683	1936	2023	2312	2743	3135	
1-1/2	38.10	1649	1870	2236	2535	2686	3026	3642	4103	




GRADE 2



GRADE 5






GRADE 8



### METRIC BOLT TORQUE SPECIFICATIONS

**NOTE:** The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

Bolt head identification marks as per grade.		
		

Size of Bolt	Grade No.	Pitch (mm)	Pounds Feet	Newton-Meters	Pitch (mm)	Pounds Feet	Newton-Meters
M6	5.6	1.0	3.6-5.8	4.9-7.9	-	-	-
	8.8		5.8-4	7.9-12.7		-	-
	10.9		7.2-10	9.8-13.6		-	-
M8	5.6	1.25	7.2-14	9.8-19	1.0	12-17	16.3-23
	8.8		17-22	23-29.8		19-27	25.7-36.6
	10.9		20-26	27.1-35.2		22-31	29.8-42
M10	5.6	1.5	20-25	27.1-33.9	1.25	20-29	27.1-39.3
	8.8		34-40	46.1-54.2		35-47	47.4-63.7
	10.9		38-46	51.5-62.3		40-52	54.2-70.5
M12	5.6	1.75	28-34	37.9-46.1	1.25	31-41	42-55.6
	8.8		51-59	69.1-79.9		56-68	75.9-92.1
	10.9		57-66	77.2-89.4		62-75	84-101.6
M14	5.6	2.0	49-56	66.4-75.9	1.5	52-64	70.5-86.7
	8.8		81-93	109.8-126		90-106	122-143.6
	10.9		96-109	130.1-147.7		107-124	145-168
M16	5.6	2.0	67-77	90.8-104.3	1.5	69-83	93.5-112.5
	8.8		116-130	157.2-176.2		120-138	162.6-187
	10.9		129-145	174.8-196.5		140-158	189.7-214.1
M18	5.6	2.0	88-100	119.2-136	1.5	100-117	136-158.5
	8.8		150-168	203.3-227.6		177-199	239.8-269.6
	10.9		175-194	237.1-262.9		202-231	273.7-313
M20	5.6	2.5	108-130	146.3-176.2	1.5	132-150	178.9-203.3
	8.8		186-205	252-277.8		206-242	279.1-327.9
	10.9		213-249	288.6-337.4		246-289	333.3-391.6

## Limited Warranty

Paladin Heavy Construction ("Paladin") warrants its products against faulty design, material, and workmanship for a period of one (1) year from date of delivery or 2,000 hours, whichever comes first. Standard Series Loader Couplers are warranted for three (3) years or 3,000 hours, whichever comes first. Special Interchange Loader Couplers and Excavator Couplers are warranted for a period of one (1) year from date of delivery or 1,000 hours, whichever comes first.

Hydraulic kits and components are warranted for one (1) year from factory delivery date. Cylinders must be returned in their entirety and not have been disassembled to be considered for warranty. After Warranty and Purchased Parts include cylinders, hydraulic valves, seal kits, electrical components and wear parts are warranted for 90 days. Disassembly, modification or welding of cylinders without Paladin's written authorization voids the warranty on the cylinder and the seals. All valves must be packaged and sealed to prevent contaminants from entering the valve during shipment. Valves improperly packaged will not be considered for warranty. Hydraulic hoses are warranted against failure due to workmanship. Improper installation, ripping or cutting due to unauthorized modifications of Paladin Heavy Construction installation procedures is not warranted. A qualified Paladin dealer or Paladin representative must install hydraulic kits and components for failures to be given warranty consideration.

Paladin will repair or replace, at its sole option, any equipment proven to Paladin's satisfaction to be of faulty design, material or workmanship. Warranty replacement parts will be shipped second day air. This warranty does not include or cover purchased subassemblies including, but not limited to, teeth, tines (forks), cylinders, blades, etc. Such purchase subassemblies are covered only by the OEM's warranty, if any, of their respective manufacturers, and not by Paladin.

Claims received 30 days past the repair date will not be considered for warranty coverage and shall be null and void.

### **LIMITATIONS AND EXCLUSIONS:**

This **LIMITED WARRANTY** does not cover product, which in the opinion of Paladin, is damaged due to abuse, misuse, misapplication, prohibited operation, improper maintenance, alteration, unauthorized service, contamination by the base machine, or normal wear and tear. This **LIMITED WARRANTY** is void if the product is modified in any way without the written consent or instruction of Paladin. This **LIMITED WARRANTY** is null and void if the product is used in a prohibited operation, or unauthorized adjustment/assembly/disassembly has occurred. This **LIMITED WARRANTY** is the exclusive warranty and is given in lieu of any and all other warranties, whether expressed or implied, arising in any fashion including but not limited to the course of dealing and course of performance, and including but not limited to warranty of merchantability or warranty of fitness for a particular purpose. Dealers or Agents of Paladin have no authority to make any type of representation or warranties on behalf of Paladin beyond those expressly set forth in this document.

Paladin Heavy Construction couplers are manufactured with a patented design to interface with Paladin attachments, OEM attachments and Paladin female adapters (ribs). The use of attachments other than Paladin attachments, OEM attachments and Paladin female adapters (ribs) will void all warranty on the Paladin Heavy Construction coupler. The use of Paladin Heavy Construction adapters on unapproved attachments is not sanctioned. A "home made" or nonstandard attachment outside the specifications for the machine will void the warranty on the Paladin Heavy Construction coupler.

In no event shall Paladin be liable to any party, including but not limited to buyer, for any direct, incidental, consequential, punitive, or special damages, including but not limited to loss of profits, loss of productivity, in any way related to or arising, directly or indirectly, from the product. The liability of Paladin for any and all losses and damages to buyer, its successors and assigns, resulting from any cause whatsoever, including the negligence of Paladin, irrespective of whether such defects are discoverable or latent, shall in no event exceed the purchase price of the product with respect to which such losses or damages are claimed.

<sup>1</sup>Attachment Technologies Inc., a subsidiary of Paladin Brands Holding, Inc. (PBHI) is referred to herein as Paladin Heavy Construction.